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ABDELNOUR, AHMED F	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/510,649	DUCKSBURG ET AL.	
	Examiner	Art Unit	
	Farras Abdelnour	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 October 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *March 17, 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claims 11-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 11-20 define computer programs embodying functional descriptive material. However, the claims do not define a computer-readable medium or memory and are thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable

medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed computer programs can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on "computer-readable medium" or equivalent in order to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1,2,4,6,7,9; 11,12,14,16,17,19; and 21,22,24,26,27,29 rejected under 35 U.S.C. 102(b) as being anticipated by Chao *et al.* US 2002/0006229 A1 (H. Chao, H.P. Fisher, and Z. Hua, "System and method for image compression and decompression").

Regarding Claims 1, 11, and 21, Chao *et al.* disclose a method of data compression for colour images wherein it incorporates the following steps (Also see Fig. 7 for apparatus, and paragraph [0070] for software implementation):

a) establishing a value for a number of scales into which a wavelet transformation is to be made (Consult figure 3 depicting three scale wavelet transform);

b) distinguishing areas in an original colour image of relatively higher importance

from those of relatively lower importance ("The non-uniform compression feature can be incorporated in to the method of FIG. 8 as follows. Steps 100-102 are performed. Then, the user creates bitmap matrices defining the partitioned areas. Each area is then wavelet transformed," page 15, paragraph [0232]);

c) transforming the colour image into a second image in a different colour system having relatively more image information in a first component and relatively less in other components ("In order to get a higher compression ratio, the RGB pixels are transformed to other color models, such as YIQ or YUV models," page 2, paragraph [0032]);

d) sub-sampling the other components to reduce their respective numbers of pixels ("An alternative process to that shown in FIG. 1 includes an optional down sampling of the IQ color planes. This down sampling may be done once or twice to produce two image planes either one-fourth or one-sixteenth the size of the original plane," page 4, paragraph [0055]);

e) transforming the first component and the sub-sampled components into wavelet coefficients with the said number of scales ("The wavelet transform (also referred to as wavelet decomposition) operates on the converted color space signals. The purpose of the wavelet transform is to represent the original image by a different basis to achieve the objective of decorrelation," page 2, paragraph [0034]);

f) transforming the importance-distinguished areas to correspond to location and number of scales of the wavelet transformation ("The main idea is to take the advantage of different quantizations at different sub-bands (wavelet quadrant) and encode each

band accordingly. Quadrants having a high variance in wavelet values can be allocated a finer mesh size for quantization, while those quadrants with smaller variances will be assigned fewer levels of quantization," page 6, paragraph [0079]); and

g) establishing a wavelet coefficient threshold and forming a reduced wavelet image by discarding wavelet coefficients which both correspond to image areas of relatively lower importance and are below the said threshold ("In step 26, the wavelet coefficients are matched against threshold values, and if the values are less than the established threshold values specified, then the resultant value is set to zero," page 3, paragraph [0043]).

Regarding Claims 2, 12, and 22, Chao *et al.* disclose a method according to Claim 1 including the step of producing a reconstituted colour image, this step comprising forming an encoded image by hierarchically encoding the reduced wavelet image, transmitting the encoded image to another location ("In step 106, sub-band quantization is performed on the wavelet coefficients. Next, in step 108 the quantized sub-bands are respectively entropy encoded. In step 110, the coded image file is output," page 6, paragraph [0079]), and implementing respective inverses of the steps of encoding, wavelet transformation, sub-sampling and colour image transformation ("FIG. 9 illustrates a flow diagram of a method of decompressing an image compressed according to the methods shown in FIG. 8. Step 120, the compressed file is input. In step 122, the input image is entropy decoded. In step 124, de-quantization is performed on the decoded image file. Next, in step 126, an inverse wavelet transform is performed

on the image. In step 128, an inverse color transformation is performed," page 6, paragraph [0080]).

Regarding Claims 4, 14, and 24, Chao *et al.* disclose a method according to Claim 1 wherein the step of distinguishing areas in an original colour image of relatively higher importance from those of relatively lower importance comprises associating differing binary digits therewith ("The main idea is to take the advantage of different quantizations at different sub-bands (wavelet quadrant) and encode each band accordingly. Quadrants having a high variance in wavelet values can be allocated a finer mesh size for quantization, while those quadrants with smaller variances will be assigned fewer levels of quantization. That is, the number of bits one wishes to allocate to the output could be varied by quadrant. Those quadrants with large variances will utilize more bits, while those with low variants will utilize fewer bits," page 6, paragraph [0079]).

Regarding Claims 6, 16, and 26, Chao *et al.* disclose a method according to Claim 1 characterised in that wherein the step of transforming the colour image into a second~ image comprises transformation into luminance, blue chrominance and red chrominance ("Step 172 transforms RGB color components to a set of color components Y-Nb-Nr, which are known," page 6, paragraph [0084]).

Regarding Claims 7, 17, and 27, Chao *et al.* disclose a method according to Claim 1 wherein the step of sub-sampling reduces pixel number to one quarter that preceding ("This down sampling may be done once or twice to produce two image

planes either one-fourth or one-sixteenth the size of the original plane," page 4, paragraph [0055]).

Regarding Claims 9, 19, and 29, Chao *et al.* disclose a method according to Claim 1 wherein the number of scales is in the range three to six ("The decomposition can be iteratively repeated L times to obtain different levels of decomposition," page 3, paragraph [0037]. Also consult Fig. 3 in Chao *et al.*, depicting a three level wavelet decomposition.).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 3, 13, and 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Chao *et al.* as applied to Claims 1 and 2, and further in view of Rabbani *et al.* (M. Rabbani and R. Joshi, An overview of the JPEG 2000 still image compression standard, Signal Processing: Image Communication, Volume 17, Issue 1, January 2002, Pages 3-48). Chao *et al.* teaches color image processing as described in claims 1 and 2. Chao *et al.* does not explicitly disclose Claim 3.

Rabbani *et al.* teaches the step of forming an encoded image comprises forming a progressive bitstream in which more important image features are encoded earlier ("Alternatively, one might want to prioritize the compressed data corresponding to the

ROI relative to the background so that it appears earlier in the codestream," page 41, column 2), and which includes information on number image rows and columns, number of scales ("The component, resolution, layer and position are indexed by c; r; l and k; respectively. It is possible that the components of an image have different number of resolution levels. In that case, the LL subbands of different components are aligned," page 27, column 1. Also consult Fig. 17 in the same reference) and filter type ("In Part 2 of the standard, arbitrary user specified wavelet decomposition filters [8,9] are permitted, and their category (even- or odd-length), type (irreversible or reversible), and weights are signaled in the codestream," page 45, column 2).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Rabbani *et al.* techniques of image encoding using progressive bit stream and image information to Chao's method of image compression using set partitioning so as to prioritize the more important features of an image to be decoded first, allow a flexible coding structure which allows reconstructing an image at various levels of resolution. Moreover, supplying the filter type in codestream allows recovery of images coded using filters tailored for specific images, leading to enhanced quality.

5. Claims 5, 15, and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over Chao *et al.* as applied to Claim 1, and further in view of Pearlman *et al.* US 5764807 A ("Data compression using set partitioning in hierarchical trees"). Chao *et al.* teaches color image compression as described in claim 1. Chao *et al.* does not explicitly disclose Claim 5.

Pearlman *et al.* teaches a method according to Claim 1 wherein:

a) the step of distinguishing areas of relatively higher importance from those of relatively lower importance comprises specifying a plurality of different levels of relatively lower importance ("By way of summary, with regard to the sorting phase, the pixels in the LIP are tested, and those that are significant at the current quantization level are moved to the LSP. Similarly, sets are sequentially evaluated following the LIS order, and when a set is found to be significant it is removed from the LIS and partitioned into new subsets. The new subsets with more than one element are added back to the LIS, while the single-coordinate sets are added to the end of the LIP or to the end of the LSP, depending whether they are insignificant or significant, respectively," column 5, line 63), and

b) the step of establishing a wavelet coefficient threshold and forming a reduced wavelet image includes discarding progressively more wavelet coefficients as area importance level diminishes ("The method further includes evaluating the descendants of the root node of each set of the LIS for significance, wherein a significant descendent of the descendants of the root node has a subband coefficient at least equal to a predetermined threshold. For each root node of the LIS having at least one significant descendant, descendants of the offspring of the root node are evaluated for significance, wherein a significant descendant of the offspring of the root node has a coefficient at least equal to the predetermined threshold. If the root node has at least one significant descendant of offspring, then each offspring of the root node is added to the LIS as a root node thereof," column 1, line 64).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Pearlman *et al.* techniques of image pixels sorting according to a significance criterion to Chao's method of image compression using set partitioning so as to achieve more efficient compression while optimizing coding of a subband decomposition of an image for transmission or storage.

6. Claims 8, 18, and 28 rejected under 35 U.S.C. 103(a) as being unpatentable over Chao *et al.* as applied to Claim 1, and further in view of Rege *et al.* (Rege, P.P.; Jog, K.S., "A new statistical bit allocation system for subband coding of images," TENCON 99. Proceedings of the IEEE Region 10 Conference , vol.1, no., pp.666-669 vol.1, 1999). Chao *et al.* does not explicitly disclose the use of Daubechies-4 wavelets.

Rege *et al.* teaches a step of wavelet transformation employing a Daubechies-4 filter ("We have used Daubechies 4 tap filters for our work," page 667, column 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Rege *et al.* techniques of image subband coding using Daubechies-4 wavelet to Chao's method of image compression using set partitioning so as to minimize the correlation between the wavelet coefficients due to their orthogonality, in addition to the ease of implementation of Daubechies-4 due to its short support.

7. Claims 10, 20, and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over Chao *et al.* as applied to Claim 1, and further in view of Shinbata US

2003/0016855 A1 ("Image processing apparatus, image processing method, storage medium, and program"). Chao *et al.* does not explicitly disclose Claim 10.

Shinbata teaches the step of establishing a wavelet coefficient threshold comprises forming a cumulative histogram of numbers of, pixels not exceeding respective wavelet coefficient values ("Alternatively, for example, this predetermined threshold value may be determined in such a manner that a cumulative histogram of the absolute values of subband coefficients may be generated, and the absolute value of a coefficient corresponding to the cumulative frequency of occurrence=80% may be selected as the value of the predetermined threshold value," page 21, paragraph [0293]).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to apply Shinbata technique of establishing wavelet coefficients threshold using cumulative histograms of subbands to Chao's method of image compression using set partitioning so as to obtain data-driven image compression, leading to an improved image compression rate.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farras Abdelnour whose telephone number is 571-270-1806. The examiner can normally be reached on Mon. - Thurs. 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on 571-272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Farras Abdelnour
Examiner
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FA

WENPENG CHEN
PRIMARY EXAMINER

9/12/07